

CLAIMS

1. A microfluidic system, in particular in a particle sorter, with

- at least one carrier flow channel (1) for supplying a carrier flow with particles (2) suspended therein,

- a first manipulation apparatus arranged in the carrier flow channel (1) for manipulating the particles (2) suspended in the carrier flow,

- a second manipulation apparatus arranged in the carrier flow channel (1) for manipulating the particles (2) suspended in the carrier flow,

characterized in that

the first manipulation apparatus and the second manipulation apparatus have a common electrode arrangement (7).

2. The microfluidic system according to Claim 1, characterized in that the common electrode arrangement additionally forms a third manipulation apparatus.

3. The microfluidic system according to any one of the preceding claims, characterized in that the common electrode arrangement (7) includes at least one electrode that is a component of the first manipulation apparatus as well as a component of the second manipulation apparatus.

4. The microfluidic system according to any one of the preceding claims, characterized in that the first manipulation apparatus is a field cage that fixes the particles (2).

5. The microfluidic system according to any one of the preceding claims, characterized in that the second manipulation apparatus is a particle gate.

6. The microfluidic system according to any one of the preceding claims, characterized in that the second or the third manipulation apparatus is a centering apparatus that centers the particles in the carrier flow channel.
7. The microfluidic system according to any one of the preceding claims, characterized in that the carrier flow channel (1) branches in a branching area into several outlet conduits (5, 6).
8. The microfluidic system according to Claim 7, characterized in that the common electrode arrangement (7) is arranged before or in the branching area.
9. The microfluidic system according to Claim 7 or 8, characterized in that a dividing line (14) runs in the carrier flow channel, the particles (15) located on the one side of the dividing line (14) flowing without an actuation of the particle gate (7) into the one outlet conduit (5) whereas the particles located on the other side of the dividing line (14) flow without an actuation of the particle gate (7) into the other outlet conduit (6).
10. The microfluidic system according to Claim 9, characterized in that the particle gate (7) is substantially arranged on the dividing surface (14).
11. The microfluidic system according to Claim 9, characterized in that the particle gate is arranged laterally next to the dividing line.
12. The microfluidic system according to any one of the preceding claims, characterized in that at least one bypass flow channel (31, 32) runs next to the carrier flow channel (30), which bypass flow channel is separated from the carrier flow channel (30) by a dividing wall (33, 34), an opening being

present in the dividing wall (33, 34) in which opening the particle gate (39-42) is arranged.

13. The microfluidic system according to any one of the preceding claims, characterized in that the electrode arrangement (7) includes at least one arrow-shaped electrode (13) and several deflection electrodes. the arrow-shaped electrode (13) being aligned in opposite direction to the direction of flow of the carrier flow whereas the deflection electrodes are arranged upstream before the arrow-shaped electrode (13) and border on the arrow-shaped electrode (13).

14. The microfluidic system according to any one of the preceding claims, characterized in that the electrode arrangement (7) includes four, six or eight electrodes that can be separately actuated.

15. The microfluidic system according to any one of the preceding claims, characterized in that the field cage has eight electrodes (44-47) whereas the centering unit (48, 49) has four electrodes, and that the four electrodes (45, 46 of the field cage located upstream are each electrically connected to one of the electrodes (48, 49) of the centering unit.

16. The microfluidic system according to any one of the preceding claims, characterized by a first measuring station (8) in which the particles (2) suspended in the carrier flow are analyzed in the flowing state upstream from the common electrode arrangement (7).

17. The microfluidic system according to any one of the preceding claims, characterized by a second measuring station (9) that analyzes the particles (2) fixed in the field cage.

18. The microfluidic system according to any one of the preceding claims, characterized by an actuation unit for actuating the common electrode arrangement, the actuation unit

being connected on the input side to the first measuring station and/or to the second measuring station and actuates the common electrode arrangement as a function of the analysis in the first measuring station and/or in the second measuring station.

19. A particle sorter with a microfluidic system according to any one of the preceding claims.

20. An actuation method for an electrode arrangement (7) arranged in a carrier flow channel (1) of a microfluidic system,

wherein in the carrier flow channel (1) a carrier flow with particles (2) suspended therein flows,

whereas the electrode arrangement (7) is actuated electrically in such a manner that the particles (2) suspended in the carrier flow are subjected by the electrode arrangement (7) to a first manipulation, characterized in that the electrode arrangement (7) is actuated selectively for carrying out the first manipulation on the particles (2) or for carrying out a second manipulation on the particles (2).

21. The actuation method according to Claim 20, characterized in that the first manipulation comprises a fixation of the suspended particles (2) whereas the second manipulation comprises a sorting of the suspended particles (2).

22. The actuation method according to any one of Claims 20 to 21, characterized in that the particles (2) suspended in the carrier flow are analyzed.

23. The actuation method according to Claim 22, characterized in that the electrode arrangement (7) is actuated as a function of the analysis of the particles (2) for carrying out the first manipulation and/or the second manipulation.

24. The use of a microfluidic system according to any one of Claims 1 to 18 for investigating and/or sorting particles, in particular biological cells.